

Welfare Measurement and the GNP

It has often been noted that the GNP cannot be regarded as an index of welfare, and this proposition has been advanced that it should be reconstructed to convert it into such an index. This view has gained prominence recently because of the mounting concern with the quality of the environment. According to Edward F. Denison, outstanding expert in national income accounting and the analysis of economic growth, such an attempt would encounter intractable obstacles. Presented here is a slightly expanded version of a short paper which Mr. Denison prepared for a conference on national growth policy. Mr. Denison stresses that the paper is not intended as a comprehensive treatment of his subject; he deals only with what he regards as its most important aspects.

The Office of Business Economics is deeply concerned with the subject matter of Mr. Denison's paper. It invites comments on the paper in the hope that these will throw further light on the complex and controversial problems he discusses. The Office also hopes that these comments will help it in the formulation of a realistic and constructive research program in an area in which much new information is required to make possible informed decisions that are vital to the equitable, efficient, and harmonious functioning of our society.

IT would be enormously convenient to have a single, generally accepted index of the economic and social welfare of the people of the United States. A glance at it would tell us how much better or worse off we had become each year and each decade. We could judge the desirability of any proposed action by asking whether it would raise or lower this index.

Some recent discussion seems almost to imply that such an index could be constructed. Articles in the popular

press even criticize GNP because it is not such a complete index of welfare, on the one hand ignoring the fact that it was never intended to be such an index, and on the other, suggesting that with appropriate changes it could be converted to one.

Components of a Welfare Measure

A single, generally acceptable index of welfare cannot be constructed. This ought to be obvious, but it may be instructive to state some of the changes in society such a measure would have to encompass and the problems its compilers would face.

Output

The output available to satisfy our wants and needs is one important determinant of welfare. Whatever want, need, or social problem engages our attention, we ordinarily can more easily find resources to deal with it when output is large and growing than when it is not. GNP measures output fairly well. Net national product (NNP) measures it even better, provided that depreciation is calculated in a consistent and reasonable way. The capital stock study of the Office of Business Economics provides data that can be used to calculate NNP.

A myriad of different products must somehow be combined if one is to obtain a measure of total output. We can obtain a generally acceptable measure only because market prices provide weights to combine them that are widely accepted as reasonable and objective. The rationale is that, given the relative prices they face, people individually or collectively are free to

spend their money in whatever way maximizes their satisfactions. If they preferred to do so, they could shift purchases from one product to another, substituting at the ratio of market prices.¹ If automobiles cost \$3,000 and TV's \$300, they could choose to buy another car and 10 fewer TV's, or the reverse.

GNP and NNP valued at constant prices permit measurement of changes in the quantity of output with products combined by use of prices in the base year (at present 1958). They are extremely useful measures. But users should understand their characteristics. Two of these seem to me to be the most important in qualifying their use in welfare measurement.

First, households, governments, and nonprofit organizations are regarded as the final users of the economy's output, and GNP and NNP measure the goods and services they buy.² How effectively they use their purchases is outside the purview of GNP or NNP. Soap, vacuum cleaners, washing machines, and the time of domestic servants bought by the housewife are measured, not how clean her house and linen may be. Similarly, the teachers' services, books, school buildings, etc., purchased by school systems are measured, as are the planes, ammunition, and soldiers' services bought by the Department of Defense; NNP does not tell how much education and national security are

1. In an economy with indirect taxes and subsidies, there is a complication which leads national accountants to construct two measures of national product. One, recommended for "welfare" questions, uses market prices as weights; the other, recommended for resource allocation problems and productivity measurement, uses factor cost values instead. For most questions and comparisons the choice makes little difference. When it matters, the appropriate choice can be made.

2. I ignore here the net capital formation and net export components of NNP.

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obtained per dollar (in 1958 prices) of expenditure for such items.

It is sometimes suggested that governments (and nonprofit organizations) should be treated as if they were businesses "selling" services to individuals. NNP in constant prices would include the services provided (measured in constant prices) instead of government purchases. Because most government purchases are for education and defense, this proposal requires ways to measure changes in the amounts of education and defense that are independent of government expenditures. But how? Educators and generals have found no acceptable procedure to make such an estimate, and until they do, it would be a bit absurd to expect the national accountant to do so. Present estimates of real GNP truly measure the services provided by governments only if the services provided per dollar of government purchases (in 1958 prices) are the same each year as in 1958.

The prospect for measuring the services a household secures from its purchases (when they are combined with the "labor" of household members, which is omitted from national product) as distinct from the value of its purchases seems at least equally remote.

The second characteristic concerns the "quality change problem." When expenditure for a new or improved product appears, it is counted as output equal to the quantity of previously existing products that could have been bought for the same expenditure (based on 1958 price ratios if the new product had appeared by then, otherwise on price ratios when it first entered price indexes).

Real NNP in 1950 was half that of 1968. This means that output in 1950 was half as big as the sum of (1) the quantity of products produced in 1968 that were the same as those produced in 1950 and (2) the quantity of 1950 products that could have been produced in 1968 by the resources that were actually used in 1968 to produce products that did not exist in 1950.

The change in real NNP understates the change in the ability of output to satisfy our wants because it ascribes no value to the increased range of products the economy is able to provide; for

example, in 1968 medicines were available that did not exist at all in 1950. I am personally convinced that there is no way to measure this understatement not all economists agree.

Such characteristics, which in my view are not remediable, limit the accuracy of real product as a measure of changes over time in the ability of output to satisfy our wants.³ Nevertheless, real product is a very useful measure. But to evaluate welfare we would need additional measures which would be far more difficult to construct.

Real costs of production

We would need an index of real costs incurred in production, because we are better off if we get the same output at less cost. The starting point for an index of labor costs exists in series for total man-hours worked, and we can also compute hours per capita or per worker. But use of man-hours for welfare evaluation would imply unreasonably that to increase total hours by raising the hours of eight women from 60 to 65 a week (coverage of the Maryland 60-hour law recently was reduced greatly) imposes no more burden than raising the hours of eight men from 40 to 45, or even than hiring one involuntarily unemployed man for 40 hours a week. A usable measure of the real costs of working would consider that the welfare benefits from working fewer hours decline as hours are shortened and may even disappear.⁴

A measure of real costs of labor would also have to consider working conditions. Most of us spend almost half our waking hours on the job and our welfare is vitally affected by the circumstances in which we pass those hours. From the beginning, labor unions have concerned themselves with "wages, hours, and working condi-

tions." Only the first of these relates to the goods and services the worker can buy; the others relate to real costs. Perhaps it is under this heading, too, that the deaths and injuries from wartime service in the armed forces, and the disutility of involuntary service in the armed forces in war or peace, should be counted.

We have data on saving, but no measure of the real costs of what was once called "abstinence." And we have no acceptable way to combine the real costs of labor and abstinence.

Needs

To measure welfare we would need a measure of changes in the needs that our output must satisfy. One aspect, population change, is now handled, crudely, by converting output to a per capita basis on the assumption that, other things equal, twice as many people need twice as many goods and services to be equally well off.⁵ Beyond this, an index of needs would account for differences in the requirements for living as the population becomes more urbanized or suburbanized; for the effect of weather changes on requirements for heat, air conditioning, and clothing; for medical requirements occasioned by epidemics or new diseases; and, most of all, for changes in national defense requirements. Such an index would have to tell us the difference between the cost of meeting our needs, to the extent that we do, in a base year, and the cost of meeting them equally well under the circumstances prevailing in every other year.

It is sometimes wrongly supposed that the necessity of taking account of some changes in needs can be obviated by omission from NNP of expenditures for purposes for which needs change: for example, by elimination of expenditures for local transportation, heat and air conditioning, health, or

3. The two characteristics I have described result from changes over time in the kinds of and products that the state of knowledge permits the economy to provide, and in the skill of individuals and governments in utilizing their purchases to meet their objectives. They do not limit the significance of comparisons of alternative national products that might be obtained at a point in time under alternative conditions or policies unless these alternatives would affect such knowledge or skill.

4. In this formulation I regard the real costs of working additional hours as including the loss of welfare resulting from less leisure time. If it is necessary to treat the two as separate items affecting welfare, the problem is still more complicated.

5. In my view, this is a tolerable assumption only if no change occurs in the composition of the population by age and family status. In the first place, requirements for individuals vary with age and marital status. Second, an intractable problem is created by the simple fact that a couple with two wanted children is not worse off than if it had no children and the family had twice the per capita income. Since the couple rejected that option they must be better off. Also, greater ability to control family size has surely improved welfare in a way that cannot be captured in any measure I know.

defense. This procedure fails utterly. It yields the false result that we are equally well off whether, in the same circumstances, we ride or must walk to work, freeze or are comfortable, do or do not obtain medical care when we are sick, or provide or do not provide for national security. Needs and provision to meet them must be separately evaluated.

The environment

Measures of "needs" shade into measures of the human and physical environment in which we live; perhaps it is here that the concept of economic welfare broadens to encompass "social welfare." We are all enormously affected by the people around us. Can we go where we like without fear of attack? Can we attend a lecture without its being disrupted? Will we be discriminated against? Are our neighbors congenial? We are also affected by the physical environment—purity of air and water, accessibility of park land, presence of trash or rats in our alleys, and all the other conditions receiving so much attention just now.

To measure the state of affairs with respect to any aspect of the human and physical environment requires adequate and accurate data. Such data are generally deficient in both quantity and quality, and collection and evaluation urgently need expansion. But, given data, construction of an index of the goodness or badness of almost any environmental aspect faces at least two serious problems.

First, relations between environmental conditions and welfare are rarely linear, and nonlinear relationships are hard to establish. A little air pollution is harmless, more an annoyance, a great deal lethal. Discrimination against Jews by a random 10 percent of employers, landlords, and operators of public places might be merely an annoyance to those affected; by 40 percent, a real hardship; by 90 percent, an economic and social catastrophe. The last situation is far more than nine times as undesirable as the first.

Second, if anything except the most detailed imaginable set of data is contemplated, weighting is required: To combine robberies and murders in a

crime index; to combine pollution of the Potomac and pollution of Lake Erie in a water pollution index; to combine trash in Northeast Washington alleys and its absence on Route 70-S into a trash index. An expert in a field may be able to provide judgments with respect to the problems of nonlinearity and weights that would permit an interesting index to be calculated. However, the necessity for numerous individual judgments that are difficult to assess or even to describe must impair general acceptability of measures based upon them.

The absence of any natural weighting scheme is an even greater obstacle to combining indexes of crime, water pollution, racial discrimination, and the like into a single index. Personally, I see no basis at all for combining indexes of different aspects of the environment into a combined index that will command general acceptance. I can imagine only letting each individual in the country compute his own index with his own personal weights, and then averaging them. But even this procedure is almost sure to be biased because we are all concerned with the aspects of the environment that currently are problems. Who would now think to consider the dangers of attack by hostile Indians? Or the risk of being doused by slops thrown from windows as he walks the city streets? Even the very recent elimination of refrigerator doors that cannot be opened from within, and cost the lives of so many children, is almost forgotten. The annual series for "Persons Lynched" appeared in the Census Bureau's *Historical Statistics* but not in its current *Statistical Abstract*.

The distribution of income

To measure welfare we would need an index of the "goodness" of the size distribution of income. There is probably a consensus that, given the same total income and output, a distribution with fewer families in poverty would be better than the present distribution, and possibly that less inequality throughout the distribution would be

an improvement. There is no agreement on an ideal distribution, from which departures could be measured.

Other aspects

The list I have presented is not exhaustive. I have ignored the hard fact that tastes differ among individuals and change over time. I have not yet recalled that welfare is affected by people's perception of reality as well as the objective facts; one's fear of crime on the streets need not be closely related to actual risks. The authors of "Toward a Social Report" stressed the need for attitudinal data to develop welfare measures. I have not provided room for any of the pleasures and worries that are related to purely personal relationships and that for most people dominate all else in affecting their feeling of well-being.

Impracticability of a general measure of welfare

Even if we could construct indexes of output, real costs, needs, the state of the environment, income distribution, and other relevant aspects of life, we could not compute a welfare index because we have no system of weights to combine them. Certainly statisticians and social scientists are in no position to assign weights.

The point to be stressed is that the situation is just the same as in making policy decisions in government, in business, in the family, or anywhere else. Most decisions that might be made have favorable and unfavorable effects on various aspects of life. Decisionmakers must try to determine the favorable and unfavorable effects of alternatives and then decide on their course of action. Economists, statisticians, and other social scientists can help determine what the effects are likely to be. But the responsible decisionmaker must decide how the favorable and unfavorable effects balance out, and different persons will decide differently. This is only another way of saying that a generally accepted weighting system does not exist.

U.S. Department of Health, Education, and Welfare, "Toward a Social Report" (January 1966).

Costs of Growth and the National Product

It is fashionable to describe our environmental problems as costs of economic growth, and even to suggest that these costs should be deducted from GNP and NNP. I have no idea whether this would raise or lower the growth rate in any particular period. But a few observations are in order.

First, some of the objections to "growth" are to an increase in population (or its geographic concentration) and the resulting congestion. Over the last two centuries, it is true, increases in productivity have permitted population to increase and led to its doing so. But this relationship is increasingly uncertain; births, which are the chief population determinant in this country, do not now follow changes in per capita income in any predictable way. It is no longer possible to regard the increase in population, and whatever disadvantages it may bring, as the consequence of an increase in output; there is no presumption that less output would mean fewer people. Moreover, there is no unanimity as to whether population growth or the steps that would be required to curtail it are undesirable or desirable. Population increase has meant less space per person and has affected other aspects of life adversely in the view of many people. Others stress the pleasures derived from children; almost none would like a higher death rate; and immigration, which has contributed importantly even to recent population growth, has presumably meant a better life for the immigrants.

Second, many aspects of the environment are only remotely, if at all, connected with the amount of production or income; and when they are, it is by no means obvious that high income worsens rather than improves the environment. Would such problems of the human environment as crime, drugs, student unrest, racial tension, and labor-management conflicts now be absent or even smaller if output and income had increased less than they did in the past decade or two? It seems unlikely.

I now turn to what clearly are environmental costs associated with

production. Air and water pollution, the volume of solid waste, and other undesirable aspects of the physical environment have been increased by economic growth or, more accurately, by the increase in the production and use of particular products which have been produced and used in particular ways. Given an index of the state of the environment, a complete welfare evaluation would not require knowledge of the extent to which changes in this index were the result of production. Nevertheless, the idea of measuring the net gain from production by balancing the value of the deterioration of the physical environment caused by production against the value of greater output is attractive. The value of this deterioration could then be deducted from NNP to obtain what many would regard as a better measure of net output. But implementation of this suggestion would require an objective measurement of the value of the deterioration expressed as a dollar amount. Such a valuation does not exist, and its estimation would encounter all the problems involved in measuring the goodness of the environment plus those of deciding what portion of changes in its goodness were due to production.

At this point, let me emphasize that expenditures actually incurred to preserve or improve the environment are not at all the same thing as the value of the deterioration of the environment that is caused by production. Such expenditures must not be deducted in lieu of the value of the deterioration caused by production. To do this would mean that the more we diverted our resources and output from other uses to improvement of the environment, the smaller would be GNP and NNP. This surely is not a desirable result.

Fortunately, GNP and NNP are not reduced by diversion of resources from other uses to environmental improvement when the costs are borne by government or by consumers because expenditures by these groups are counted as final products. (This generalization includes such cases as the addition of antipollution devices to automobiles because in the national accounts the addition is regarded as

increasing the quantity, rather than the price, of cars.)⁷

GNP and NNP can be regarded as providing defective measures of changes in output when expenditures to protect the environment are incurred by business in the form of current costs. Such purchases are not themselves counted as final products and they absorb resources that would otherwise be used to produce products that are counted as final. Steps already taken, and adoption of additional proposals, to increase expenditures for environmental control of this type will have the effect of reducing real output and productivity, as measured, below the values they would take if resources were not so diverted. Business expenditures for the safety of employees, which are also likely to rise as a result of new legislation, will have the same effect. The reduction in measured output could be avoided only by isolating business expenditures for these purposes and adding them to national product as final product. Such a solution is not, I fear, feasible because such a classification of business expenditures would encounter distinctions that are gradual and blurred. What we would need to know is the amount by which business unit costs exceed the theoretical minimum that could be achieved if production were to be conducted with no regard at all to the external environment or to employee welfare—implying no laws, no community pressure, and no conscience. Such a situation has never prevailed and is difficult even to imagine. What perhaps can be done, and should surely be attempted, is to start now to collect information on changes in expenditures for environmental and employee protection that will occur in the future. Even if such information does not lead or enable us to change the measure of output, it will enable us to interpret better the changes in output and productivity that we observe in the future as well as to know the true costs of the new programs.

7. Neither are GNP and NNP reduced, in the first instance, when business makes capital outlays for this purpose. But in the case of business capital outlays NNP is eventually reduced by a rise in depreciation, just as it is in the case to which I turn next.

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Implications for statistics

We need, can obtain, and should obtain additional information, including statistics, on many aspects of American life that affect welfare. We can and should explore ways of presenting and analyzing such information in a comprehensible form. Some of this research could well be performed by individuals familiar with estimation of the national accounts, because some of the statistical

and conceptual problems are similar. However, we cannot obtain a comprehensive index of welfare.

There are likely to be pressures to make *ad hoc* changes in the existing national product measures that, it is supposed, will move the national product series closer to a complete welfare measure in one way or another. Such suggestions should be welcomed if they improve the measurement of the Nation's output. I would myself urge regular publication of series for NNP

and national income, as well as GNP, in constant prices. But some suggestions to change the measurement of national product will derive from confusion between an output measure and a comprehensive welfare measure. Such proposals must be rejected. GNP and NNP cannot be transformed into a comprehensive welfare measure. Efforts to do so can only impair their usefulness for the very important purposes of both long-term and short-term analysis that they now serve well.

The best single source of information concerning the activities of the NATIONAL BUREAU of STANDARDS is the

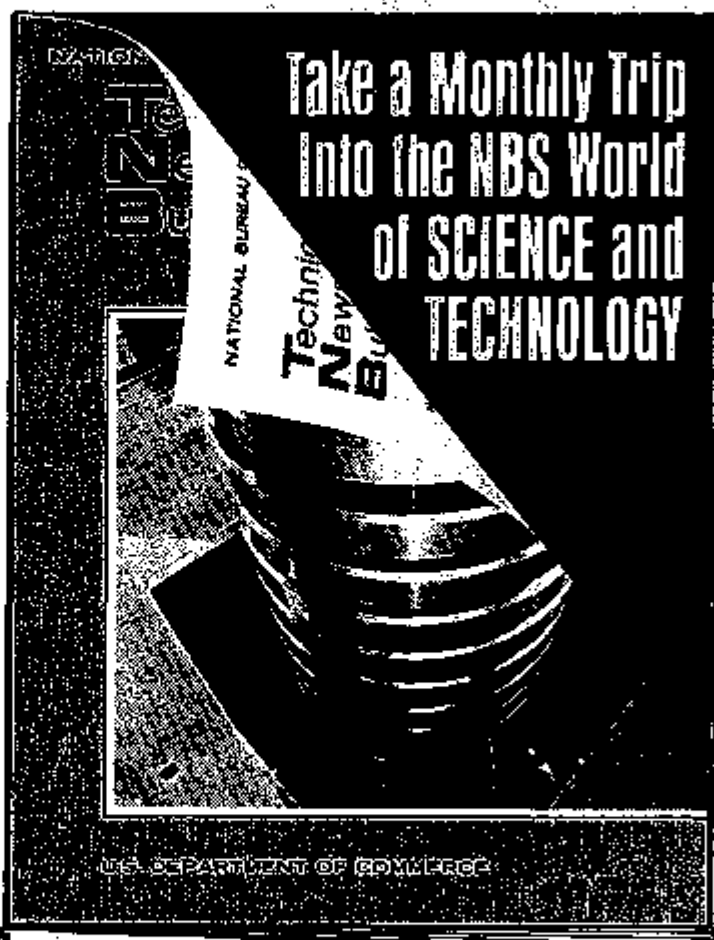
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